

## Quarterly Status, Management, and Cost Report #10

**Contract Name:** Seismic Calibration for IMS Stations in North Africa and Western Asia (Group 2)

**Contractor:** Science Applications International Corporation

**Contract Number:** DTRA01-00-C-0013

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**Period of Performance:** March 1, 2000 – February 28, 2003

**Reporting Period:** June 22, 2002 – September 13, 2002

## Background

The Group 2 Consortium is composed of SAIC as the prime contractor with Harvard University, University of Colorado at Boulder (CUB), University of California San Diego (UCSD), Geophysical Institute of Israel (GII), Multimax, and Western Services as subcontractors.

Travel-time corrections will be developed, tested, and validated in two phases over a period of three years. The team will construct location corrections, as recommended by CTBT/WGB/TL-2/18, using three methodologies: 1) Tectonic regionalization will be used to assign 1D velocity models to each tectonic province and SSSCs computed by 2D and 3D ray-tracing. 2) 3D hybrid models consisting of global and regional models will be constructed and ray-tracing will be performed. 3D hybrid models will make use of the best available models for each region. Team members as part of related work may perform revision of 3D models using available data in selected regions. 3) Event clusters will be selected and Joint Hypocenter Determination (JHD) will be used to define empirical travel time corrections for small selected regions. Inter-comparison of methodologies will contribute to a priori modeling error estimates. Offline unit testing and validation of model-based SSSCs will be performed using existing and expanded Ground Truth (GT).

## Progress in Current Reporting Period (June 22, 2002 – September 13, 2002)

### Administrative

- The “Phase 2 Delivery and Test Plan” was delivered to the CMR RDSS and posted on the Consortium web page, ([http://g2calibration.cmr.gov/calibration/files/group2\\_plan.pdf](http://g2calibration.cmr.gov/calibration/files/group2_plan.pdf)).

### Meetings/papers/memos

- Several papers by consortium members were submitted to reviewed journals. They are posted to (<http://g2calibration.cmr.gov/calibration/refer.html>).

Antolik, M., Y.J. Gu, G. Ekström and A. Dziewonski, J362D28: A new joint model of compressional and shear velocities in the Earth's mantle, submitted to *Geophys. J. Int.*, 2002.

[Bondár, I., S.C. Myers, E.R. Engdahl and E.A. Bergman, Epicenter accuracy based on seismic network criteria](#), submitted to *Geophys. J. Int.*, 2002.

[Ritzwoller, M.H., N.M. Shapiro, M.P. Barmin and A. Levshin, Global surface wave diffraction tomography](#), submitted to *J. Geophys. Res.*, 2002.

[Ritzwoller, M.H., N.M. Shapiro, A. Levshin, E.A. Bergman and E.R. Engdahl, Assessment of global 3-D models based on regional ground truth locations and travel times](#), submitted to *J. Geophys. Res.*, 2002.

[Shapiro, N.M. and M.H. Ritzwoller, Thermodynamic constraints on seismic inversions](#), submitted to *Geophys. J. Int.*, 2002.

- The paper for the 2002 SRS mtg was submitted and posted at the Consortium web site.

[McLaughlin, K., I. Bondár, X. Yang, J. Bhattacharyya, H. Israelsson, R. North, V. Kirichenko, E.R. Engdahl, M. Ritzwoller, A. Levshin, N. Shapiro, M. Antolik, A. Dziewonski, G. Ekström, H. Ghalib, I. Gupta, R. Wagner, W. Chan, W. Rivers, A. Hofstetter, A. Shapira, and G. Laske, Seismic Location Calibration in the Mediterranean, North Africa, Middle East and Western Eurasia](#), *24th Seismic Research Review*, Ponte Vedra Beach, FL, September 17-19, 2002.

### Data development

Reference Event List 2.X. Reference events (GT0-10) and seismic event bulletins continue to be collected and merged in the Consortium's region of interest (15S-80N, 40W-100E):

- The Reference Event List 2.1 has been released, it contains 1971 GT0-10 events (<http://g2calibration.cmr.gov/calibration/data.html#rel21>).
- Consortium web pages were updated to present Reference Event List 2.1 metadata and provide an interactive search mechanism for origins by date & location (<http://g2calibration.cmr.gov/calibration/refsel.html>) (SAIC).

- The cluster database was updated with cluster centroids and empirical path corrections from 62 HDC and JHD clusters (CUB & SAIC).

#### Model/SSSC development:

During this reporting period the consortium continued to focus on Phase 2 model and SSSC development. During Phase 2, CUB will provide a revised 3D crust & upper mantle model (CUB2.0), CUB will continue to collect reference event data and validate GTX events with HDC cluster analysis, Harvard & SAIC will pursue the use of teleseismic P-wave SSSCs in the Group 2 region, Multimax continues to collect and analyze reference events, GII continues to collect reference event data and investigate regional Pg and Lg in the Middle East, UCSD is evaluating crustal models for the region, Western Services will collect reference event data in central Asia, SAIC will continue to coordinate activities, maintain the reference event database, investigate model errors, and integration results. Some highlights of the reporting period are listed below.

- CUB delivered a new model, CUB2.0 along with an updated raytracer for local and regional phases (Pg, Lg, Pn, Sn). SAIC has begun computing regional SSSCs for some 3,000 stations.
- Harvard delivered a new model, J362D28, and a new raytracer for teleseismic P/S-wave SSSCs to the consortium. SAIC is computing teleseismic SSSCs and carried out preliminary integration and testing.

## Plans for Next Reporting Period (June 22, 2002 – September 13, 2002)

#### Administrative

- NA

#### Papers/reports/memos

- The 2002 SRS meeting poster will be presented.

#### Data development

- Reference event collection and validation will continue. Emphasis will be placed on consolidating the Reference Event List 2.1 for relocation testing and validation in the Fall of 2002.
- Access to the “Reference Event Cluster Database” will be provided on the Consortium web page.

#### Model development

- Validation testing of the CUB2.0 and J362D28 models will be carried out.

#### SSSC validation

- Relocation tests will be performed to validate both regional and teleseismic SSSCs.

## Cost Report

See attachments.